PHYSICAL MATHEMATICS SEMINAR

Dedalus:
A flexible spectral solver for fluid dynamics

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ABSTRACT:

Dedalus is an open-source framework for solving partial differential algebraic equations using global spectral methods. It is designed for maximum flexibility and incorporates features such as symbolic equation entry, custom domain construction, and automatic MPI parallelization. I will describe several key algorithmic features of the code, including our sparse discretization, multidimensional domain distribution, and our recent work towards supporting general tensor calculus in curvilinear domains. Along the way, I will show examples of the code's capabilities with applications to various fields, including astrophysical and geophysical fluid dynamics, and active matter. In particular, I will focus on how the general features of the codebase allow for the efficient implementation of a wide range of models in fluid dynamics, such as non-splitting formulations for incompressible flows and acoustic-super-stepping formulations for compressible flows.

TUESDAY, OCTOBER 3, 2017
2:30 PM
Building 2, Room 142

Reception following in Building 2, Room 290
(Math Dept. Common Room)

http://math.mit.edu/seminars/pms/

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